CHANGING TIDES – A SOUTH PACIFIC STUDY

KIRSTEN DAVIES[1]

ABSTRACT

Science confirms that global warming, or anthropocentrically induced climate change, poses a significant threat to marine environments, food security and livelihoods of South Pacific nation communities who are particularly vulnerable due to their socio-economic status and unique geographical characteristics. Can current legislation, including traditional customary law, protect their ecosystems, in the context of the unprecedented paradigm presented by climate change? This paper explores a range of legal frameworks from international to domestic law, concerned with protecting the marine environment. It proposes that, in order to successfully adapt to these rapid changes, community understandings of the local ecology can assist in adaptation management processes. Traditional indigenous knowledge, customary law and practices may offer part of the solution, as they are embedded in local culture, landscapes, seascapes and are 'bespoke' to specific localities and communities. That is not to say that customary law offers the complete solution. Rather building on traditional knowledge methods will provide adaptive co-management approaches that facilitate science, technology and the law coming together to protect natural systems threatened by the changing climate. One of the benefits of such an approach is its likelihood of success by honouring the local culture, communities will be more inclined to be engaged. Evidence of the uptake of this changing approach can be seen in nations such as Samoa, where local by-laws have been drafted to create community-owned protected areas, while citizens are simultaneously trained to monitor and manage local biodiversity. This paper advocates for localised management approaches focused on empowering communities in the conservation of their marine ecosystems. Finally it returns to the law, highlighting the urgent need for legal instruments, across all jurisdictions, to support adaptive co-management, noting the South Pacific experience offers lessons to other regions and their indigenous peoples, as the planet grapples with the challenge of how to respond rapidly to the threats posed by climate change.

Keywords: Customary Law, Climate change, Climate science, South Pacific, marine ecosystems, local communities, adaptive co-management , Small Island Developing States

Acknowledgement: This paper forms part of the research collaboration with the University of the South Pacific Law School

[1] Macquarie Law School, Sydney Australia. Email: Kirsty.davies@mq.edu.au

1. INTRODUCTION

Marine ecosystems are changing and threatened due to global warming, or anthropocentrically driven climate change (thereafter referred to as 'climate change'), impacting marine health, including fish populations. These shifts are compounded by the reliance of many Small Island Developing State (SIDS) communities on marine ecosystems for food to support their livelihoods. For example, in the South Pacific region, fish provide between 50 and 90 percent of animal protein.[2] This paper focuses on responding to the effects of climate change on oceanic habitats that are disproportionately affecting the communities of SIDS, due to their vulnerability and lack of adaptive capacity.[3] It does so, by firstly presenting the scientific evidence that describes this escalating problem, anchoring the study in the South Pacific Region.

The second part of the paper focuses on the law surrounding the protection of marine systems with a particular emphasis on the role of customary law. According to the *Corpus Juris Civilis*, customary law is an "unwritten law…which usage has approved: for ancient customs, when approved by consent of those who follow them, are like statute."[4] Customary law is law established by usage. Statutes are only binding once they have been judged and accepted by the public. As a result, anything that is publicly approved, with or without a written rule, is equally binding for all. [5]

The paper then maps legal frameworks and how they respond to customary law inclusions. Such as the sovereign ownership over marine resources, which is legislated by the State under the *United Nations Convention on the Law of the Sea* (UNCLOS) and States must legislate accordingly. Under UNCLOS, traditional fishing practices must be recognised, albeit without prejudice to the sovereignty that extends over the archipelagic baselines. Many constitutions provide for the recognition of customary law as either an independent source of law, or as part of the law of the State. Across the South Pacific, customary law is recognised by national law

[2] Johann Bell et al. 'Adapting tropical Pacific fisheries and aquaculture to climate change: management measures, policies and investments.' *Vulnerability of Tropical Pacific Fisheries and Aquaculture to Climate Change. Secretariat of the Pacific Community, Noumea, New Caledonia* (2011): 803-876.
[3] Patrice Guillotreau, Liam Campling and Jan Robinson 'Vulnerability of small island fishery economies to climate and institutional changes' (2012) 4 *Current Opinion in Environmental Sustainability* 287-291, 288.
[4] Justinian, *Institutiones Justiniani* (J.B. Moyle trans, Oxford, 1911).
[5] Justinian, *Justiniani Digesta* (Charles Monro trans, Cambridge University Press, 1904).

under the constitutions of at least twelve nations. [6] Environmental management, including marine ecosystems, is ultimately a State issue. However, it has been suggested that customary management practices have a higher rate of local acceptance and, as a direct consequence, produce management strategies with higher conservation values.[7]

The third section of this paper investigates hybrid approaches to marine ecosystem management that combine traditional ecological knowledge (TEK), customary law, international law and the law of the State, with a particular focus on practices in the Republic of Vanuatu. Adopting and implementing traditional management approaches is dependent on a State's recognition of customary law. Various problems can arise, such as differences in the application, reasoning, intent and the conceptual underpinning between customary and Western practices.The challenge is, how to utilise the best of both approaches for the sake of conservation, combining elements of sustainable development to ensure the long-term viability of ecosystems.

The first (2016) *World Ocean Assessment* highlighted the importance of adopting such a hybrid approach to management that includes local input, by noting that "although climate change is perceived as a broadly global phenomenon, its impacts will be local, depending on a host of local/regional drivers that will interact with global climate changes".[8]

Highlighting the importance of the focus of this paper are the (2015) Sustainable Development Goals (SDG) that strive to "take urgent action to combat climate change and its impacts" (SDG 13) and "conserve and sustainably use the oceans, seas and marine resources for sustainable development" (SDG 14).[9]

This paper presents the interplay between scientific, legal and management perspectives that will assist the advancement of the adaptive capacity and food security of SIDS , particularly in

[6] Katrina Cuskelly, *Customs and Constitutions: State Recognition of Customary Law around the World*, (International Union for Conservation of Nature and Natural Resources 2011) 18.
[7] Joshua Cinner, Shankar Aswani, 'Integrating Customary Management into Marine Conservation' (2007) 140 *Biological Conservation* 201-216, 202.
[8] Office of Legal Affairs, *The First Global Integrated Marine Assessment: World Ocean Assessment 1*, (21 January 2016) Oceans and Law of the Sea: United Nations http://www.un.org/Depts/los/global_reporting/WOA_RPROC/WOACompilation.pdf 4.
[9] *Progress towards the Sustainable Development Goals – Report of the Secretary-General*, Agenda items 5, 6 and 18(a), 75th sess, UN Doc E/2016/75 (27 July 2016) 17-18.

the context of South Pacific communities, as they face of an uncertain future due to climate variability.

PART 1- THE SCIENCE

1.Climate change, oceans and marine ecosystems

Cumulative post-industrial emissions have not only increased the global temperature, they have also disturbed regional weather patterns, altered the circulation, nutrient loads, and acidity of oceans, and caused the sea level to rise[10]. These direct consequences of greenhouse gas emissions are:

> affecting marine biological processes from genes to ecosystems, over scales from rock pools to ocean basins, impacting ecosystem services and threatening human food security.[11]

In terms of anthropogenic inputs, "Atmospheric concentrations of [Green House Gases] GHGs are at levels that are unprecedented in at least 800,000 years." [12] The last 40 years have seen approximately half of the cumulative CO2 emissions occur.[13] There has been a steady increase in total annual anthropogenic GHG emissions since 1970, with the largest absolute increases occurring from 2000-2010.[14] As a result, ocean warming is projected to continue into the 21st century, with the strongest warming occurring in subtropical regions of the Northern Hemisphere and tropical regions worldwide. [15] The upper layers of the ocean have warmed by approximately 0.11 [0.09 to 0.13] °C per decade over the period 1971 to 2010.[16] In association

[10] Office of Legal Affairs, *The First Global Integrated Marine Assessment: World Ocean Assessment 1,* (21 January 2016) Oceans and Law of the Sea: United Nations http://www.un.org/Depts/los/global_reporting/WOA_RPROC/WOACompilation.pdf 4.
[11] Andrew S. Brierley and Michael J. Kingsford 'Impacts of Climate Change on Marine Organisms and Ecosystems' (2009) 19(14) *Current Biology* R602–R614, R602.
[12] Rajendra Pachauri et al., 'Observed Changes and their Causes' in *Climate Change 2014 Synthesis Report* (Contribution of Working Groups I, II and III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change, Geneva, Switzerland) 44.
[13] Ibid 45.
[14] Ibid.
[15] Ibid 60.
[16] Ibid 40.

with this warming comes a "set of additional abiotic changes in marine ecosystems, including sea level rise, more intense storms, and changes in wind strength and upwelling patterns."[17]

There are regional differences in the projected impacts. According to climate models, by the 2030s the sea-surface temperatures surrounding Australia will increase 1-2ºC, rising a further 2-3º by the 2070s.[18] Sea level rise and the increased risk of storm surges, flooding and erosion threaten the viability of communities, particularly those who are coastal dwellers.[19] This will lead "not only to decreased harvesting capacity but also to the disruption of public infrastructure and services that support livelihoods" [20] and thus the displacement of people. Changes in ocean temperatures, salinity, pH, and sea level rise are not uniform, and all interact with ocean circulation and currents.[21] Marine life in polar and tropical regions is more vulnerable, as they have narrower temperature bands in which they can survive.[22] Pacific islands are predicted to have shifts in temperature and rainfall patterns, such as in the case of Vanuatu, which is projected to have drier dry seasons and wetter wet seasons.[23]

The impacts of climate change on marine systems broadly includes; increased ocean temperatures, sea level rise, and changes in ocean salinity and acidification.[24] These impacts are predicted to result in; growing areas of the ocean that are nutrient-poor and cannot sustain diverse marine ecosystems, warming of the upper ocean, and a difficulty for organisms to adapt to changes in temperature, pH, and salt content, which will affect their development and life

[17] Joanna R. Bernhardt and Heather M. Leslie, 'Resilience to Climate Change in Coastal Marine Ecosystems' (2013) 5 *Annual Review Marine Science* 371-392, 372.
[18] Nick Caputi, Alan Pearce and Rod Lenanton, citing E.S. Poloczanska et al, 'Climate Change and Australian Marine Life' (2007) 45 *Oceanography and Marine Biology Annual Review* 409-480.
[19] Adel Heenan et al., 'A climate-informed, ecosystem approach to fisheries management' (2015) 57 *Marine Policy* 182-192, 185.
[20] Marie-Caroline Badjeck et al., 'Impacts of climate variability and change on fishery-based livelihoods' (2010) 34 *Marine Policy* 375-383, 377.
[21] Scott Doney et al, 'Climate Change Impacts on Marine Ecosystems' (2012) 4 *Annual Review of Marine Science* 11-37.
[22] Hans Pörtner et al., 'Ocean Systems' in *Climate Change 2014: Impacts, Adaptation, and Vulnerability. Part A: Global and Sectoral Aspects* (Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change, Cambridge University Press, (2014) 414-415.
[23] Christensen et al., 'Climate Phenomena and their Relevance for Future Regional Climate Change' in *Climate Change 2013: The Physical Science Basis* (Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change Cambridge University Press, 2013) 1276.
[24] Monika Rhein et al., 'Observations: Oceans' in *Climate Change 2013: The Physical Science Basis* (Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change, Cambridge University Press, 2013) 257-258.

cycles.[25] Projected Increases in the size of low oxygen (hypoxic) zones and events also affect the ability of marine ecosystems to recover.[26]

Climate change affects not only the physical and biological marine ecosystem structures, but also augments biogeochemical relationships within those ecosystems, modifying their structure and the amount of ecosystem goods and services they provide.[27] Changing interactions, include those between species, as it alters "nutrient availability, biological productivity, the timing of biological events and predator–prey relationships."[28]

Sea grasses, mangroves, and coral are particularly susceptible to changes in ocean temperatures and chemical composition.[29] Coral reefs are affected by temperature increases and acidification, while sea grasses are more threatened by temperature, turbidity, and sea level rise.[30] This will have an impact on the species which rely on them, including sea birds and marine mammals. Marine ecosystems and fisheries are also affected by El Niño-La Niña cycles, which influence the distribution and depth of fisheries.[31] In other words, any change in frequency of El Niño-La Niña will compound marine ecosystems' ability to respond.[32]

2.Climate Change and fisheries

[25] Ove Hoegh-Guldberg and John F. Bruno 'The Impact of Climate Change on the Worlds Marine Ecosystems' (2010) 328(5985) *Science* 1523-1528.
[26] Robert Diaz and Rutger Rosenberg 'Spreading Dead Zones and Consequences for Marine Ecosystems' (2008) 321(5891) *Science* 926-929.
[27] Kyriaki Remoundou, 'Valuing climate change mitigation: A choice experiment on a coastal and marine ecosystem' (2015) 11 *Ecosystem Services* 87-94, 87.
[28] Ibid.
[29] Hoegh-Guldberg and Bruna, above n 24.
[30] MRAG Asia Pacific 'Monitoring the Vulnerability and Adaptation of Pacific Coastal Fisheries to Climate Change.' Report Prepared for the Secretariat of the Pacific Community. Marine Resources Division (2010) Brisbane, Australia.
[31] Alberto Mestas-Nunes and Arthur Miller 'Interdecadal Variability and Climate Change in the Eastern Tropical Pacific: A Review' (2006) 69(2) *Progress in Oceanography* 267-284.
[32] Food and Agriculture Organisation (2011) *Review of the state of world marine fishery resources FAO Fisheries and aquaculture technical paper 569*. Marine and Inland Fisheries Service, Marine and Aquaculture Resources Use and Conservation Division, FAO Fisheries and Aquaculture Department. Rome

The world's fish populations are directly responding to climate change, specifically to changes in Sea Surface Temperature (SST)[33] that have resulted in shifts in the spatio-temporal distribution of fish stocks that are also referred to as "climate forced distribution shifts."[34] There are several studies that have documented how climate change is already resulting in changes to the spatial distribution of fish stocks.[35] Climate change, and subsequent changes in SST, are predicted to result in a pole-ward shift of fish species which has ramifications for commercial fisheries and subsistence fishing.[36] There is also increasing evidence that the changing distribution of species results in shorter life spans and smaller sizes of stock at maturity.[37] This has implications for indigenous species as the expansion of non-indigenous species introduces competition, resulting in ecological and economic impacts on local fish stocks.[38] Additionally, Changes in distribution can coincide with a spreading of pathogens and competitors to new areas[39] which can cause "mass mortalities of many aquatic species".[40]

Areas of the Indo-Pacific are likely to experience some of the highest reductions on plankton, the base of the food chain[41] impacting local ecosystems.[42] Additionally, overfishing contributes to an increase in coral bleaching and algal blooms as ecosystems become degraded and less resilient.[43] Studying climate change impacts on fisheries, Keith Brander observes that these factors "may all cause additional stress on exploited fish populations and thus reduce resilience and surplus production."[44] The sustained productivity of fisheries and other

[33] Kenneth Sherman 'Toward Ecosystem-based Management (EBM) of the World's Large Marine Ecosystems During Climate Change' (2014) 11 *Environmental Development* 43-66, 57.
[34] Jason S Link, Janet A Nye and Jonathan A Hare, 'Guidelines for Incorporating Fish Distribution Shifts into a Fisheries Management Context' (2011) 12 *Fish and Fisheries* 461-469, 461.
[35] Gian-Reto Walther et al., 'Ecological responses to recent climate change' (2002) 416 *Nature* 389-395; Allison L. Perry, Paula J. Low, Jim R. Ellis, John D. Reynolds, 'Climate Change and Distribution Shifts in Marine Fishes' (2005) 308(5730) *Science* 1912-1915; Keith Brander, 'Global Fish Production and Climate Change' (2007) 104(50) Proceedings of the National Academy of Sciences of the United States of America 19709-19714.
[36] Perry et al, above n 34, 1912.
[37] Ibid 1914; Martin Genner et al., 'Body-size dependent responses of marine fish assemblage to climate change and fishing over a century-long scale' (2010) 16 *Global Change Biology* 517-527.
[38] Sapna Sharma et al., 'Comparing Climate Change and Species Invasions as Drivers of Coldwater Fish Population Extirpations' (2011) 6(8) *PLoS ONE* 1-8, 1.
[39] Keith Brander, 'Impacts of Climate Change on Fisheries' (2010) 79 *Journal of Marine Sciences* 389-402, 398.
[40] Brander, above n 34, 19710.
[41] Julia L. Blanchard, Simon Jennings, Robert Holmes, James Harle, Gorka Merino, J. Icarus Allen, Jason Holt, Nicholas K. Dulvy, Manuel Barange, 'Potential consequences of climate change for primary production and fish production in large marine ecosystems' (2012) 367(1605) *Philosophical Transactions of the Royal Society B: Biological Sciences* 2979-2989.
[42] Ibid.
[43] Doney et al, above n 20, 24.
[44] Brander, 'Impacts of Climate Change on Fisheries', above n 38, 399.

ecosystem services will be challenged by the global species redistribution and the reduction of biodiversity climate change entails, particularly in low latitudes.[45]

The projected diminution of fish stock is not consistent across the world. One projection suggests an overall increase in fish production of 3.4% by 2050, with regional changes including up to 30% increases contrasted by decreases of up to 15% in other locations, with reductions more common in tropical countries.[46] This means that some fisheries will improve while others will become less viable. The Food and Agriculture Organisation (FAO) notes that the impact of climate change on some fish species may mean previous rates of commercial and subsistence fishing will no longer be sustainable.[47]

Shifts in the distribution of fish throughout the Pacific, together with changes in abundance, variation and diversity, will negatively affect developing countries, such as Pacific Island SIDS.[48] For example, it is predicted that oceanic changes will lead to shifts in Tuna distribution, with projected changes by 2050 including increases of 50% or more near Tokelau and Tonga and 15% near Vanuatu, then decreases in Papua New Guinea and Solomon Islands.[49]

3.Fisheries and food security

There is growing concern surrounding the implications of climate change on food security, particularly in developing nations.[50] It is estimated that at least 20% of global protein intake is provided by fish products, supporting the livelihoods of approximately 520 million people.[51]

[45] Rajendra Pachauri et al., 'Future Climate Changes, Risks and Impacts' in *Climate Change 2014 Synthesis Report* (Contribution of Working Groups I, II and III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change, Geneva, Switzerland) 67.
[46] Manuel Barange, G. Merino, J. L. Blanchard, J. Scholtens, J. Harle, E. H. Allison, J. I. Allen, J. Holt & S. Jennings, 'Impacts of climate change on marine ecosystem production in societies dependent on fisheries' (2014) 4 *Nature Climate Change* 211-216.
[47] Food and Agriculture Organisation (2011) *Review of the state of world marine fishery resources FAO Fisheries and aquaculture technical paper 569*. Marine and Inland Fisheries Service, Marine and Aquaculture Resources Use and Conservation Division, FAO Fisheries and Aquaculture Department. Rome 384
[48] Heenan et al, above n 18, 184.
[49] Bell et al, above n 1, 803-876.
[50] Badjeck et al, above n 19; Rajendra Pachauri et al., 'Summary for Policymakers' in *Climate Change 2014 Synthesis Report* (Contribution of Working Groups I, II and III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change, Geneva, Switzerland) 13.
[51] Badjeck et al, above n 19, 375.

Fish are particularly important to developing countries[52] providing up to 90% of the protein intake .[53] Therefore, a reduction in fish production is predicted to result in poor nourishment and malnutrition in some developing countries.[54]

SIDS are particularly vulnerable to climatic variability due to their geography, exposure to natural disasters and high dependence on coral reef fisheries.[55] As developing nations, they have high levels of sensitivity, exposure and economic dependency on local fishing industries, together with a relatively poor capacity to adapt to change.[56] To magnify this problem, sea level rise poses a widely recognised threat to low-lying coastal areas[57] . These threats of inundation include the destruction of infrastructure (such as roads) and the relocation of villages.

Many of the fish that Pacific communities traditionally rely upon for food are found in reefs and other near-shore fisheries.[58] The impacts of climate change on tropical coral reefs is projected to lead to a 20% drop in coral fisheries in the Pacific Islands by 2050[59] making it difficult for countries, such as Fiji, Samoa, and Vanuatu, to maintain the normal amount of fish for consumption.[60]

Looking specifically at the Pacific, it is predicted that coastal fisheries will be "less productive due to the degradation of coral reefs caused by the projected synergistic effects of more frequent bleaching, lower levels of carbonate, increased cyclone intensity and greater turbidity

[52] Ashley Ficke, Christopher Myrick, Lara Hansen 'Potential impacts of global climate change of freshwater fisheries' (2007) 17(4) *Reviews in Fish Biology and Fisheries* 581-613, 604.
[53] Jim Salinger and Alistair Hobday, 'Safeguarding the future of oceanic fisheries under climate change depends on timely preparation' (2013) 119 *Climatic Change* 3-8, 3.
[54] Heenan et al, above n 18, 185.
[55] Robert Gillet and Ian Cartwright 'The Future of Pacific Island Fisheries' (Secretariat of the Pacific Community Nouméa, New Caledonia, Pacific Island Forum Fisheries Agency, Honiara, Solomon Islands, 2010) 22.
[56] Guillotreau et al, above n 2, 287.
[57] Leonard Nurse, Rodger McLean 'Small Islands' in *Climate Change 2014 Impacts, Adaptation and Vulnerability* (Working Group II Contribution to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change, Cambridge University Press, 2014) 1619.
[58] Michelle Lam, 'Consideration of customary marine tenure system in the establishment of marine protected areas in the South Pacific' (1998) 39 *Ocean & Coastal Management* 97-104.
[59] Poh Poh Wong et al.: Coastal systems and low-lying areas. In: Climate Change 2014: Impacts, Adaptation, and Vulnerability. Part A: Global and Sectoral Aspects. Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change [Field, C.B., V.R. Barros, D.J. Dokken, K.J. Mach, M.D. Mastrandrea, T.E. Bilir, M. Chatterjee, K.L. Ebi, Y.O. Estrada, R.C. Genova, B. Girma, E.S. Kissel, A.N. Levy, S. MacCracken, P.R. Mastrandrea, and L.L. White (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, (2014) pp. 361-409.
[60] Ibid; Nurse and Mclean, above n 56.

of coastal waters". Additionally it is likely that aquaculture will encounter problems predicated by higher temperatures, floods and rising acidification. [61] For example, in Vanuatu, subsistence fisheries extending over 3100km^2 in waters from 0-100m in depth, engage approximately 50% of the rural population and play a central role in supplying the nation's protein.[62]

PART 2- THE LAW

The science surrounding the threats of climate change, on marine ecosystems is becoming clear, as established in the first scientific section of this paper. The implications of these threats, particularly on food security for subsistence communities living in SIDS coastal communities, is of significant concern. The following discussion investigates how the law responds to these challenges. Included is consideration of the role customary law plays in the protection of marine ecosystems in the South Pacific. This is important to understand for many reasons. Indigenous peoples inhabiting Pacific islands, at least partially, maintain a traditional lifestyle. Customary law remains intact as part of their cultural identity, livelihoods[63] and the ways in which they care for nature. These strong connections between people and nature offer bespoke frameworks, individualised for the characteristics of local ecosystems that may assist. Basing management approaches on customary law and TEK platforms has an increased likelihood of engaging communities due to their historic origins and the interconnections of custom with identity and belonging. Most importantly customary law, practices and TEK could provide the foundations of adaptive frameworks that support responses to the impacts of climate change. We commence the legal discussion of this paper with a brief outline of international law, as it plays an important role in informing State law and policy[64] which are the main focus of this paper.

4. International Law: The United Nations Convention on the Law of the Sea

[61] Gillet and Cartwright, above n 54, 8.
[62] Marc Léopold et al., 'Community-based management of near-shore fisheries in Vanuatu: What works?' (2013) 42 *Marine Policy* 167-176, 168.
[63] Erika Techera 'Customary law and Community-Based Fisheries Management Across the South Pacific Region' (2010) 2 *Journal of the Australasian Teachers Association* 279-292, 280.
[64] Erika Techera, 'Legal Pluralism, Indigenous People and Small Island Developing States: Achieving Good Environmental Governance in the South Pacific' (2010) 42(61) *Journal of Legal Pluralism and Unofficial Law* 171-204, 171.

The United Nations Convention on the Law of the Sea (UNCLOS) is an international treaty which establishes a legal order for the ocean and provides a "global framework for the protection and management of the marine environment and the conservation and management of its living and non-living resources."[65] It is characterised as the "most comprehensive attempt at creating a unified regime for governance of the rights of nations with respect to the world's oceans."[66] With 320 articles and nine annexes, UNCLOS is one of the longest treaties in history which codifies both "customary international law and its progressive development" and addresses a range of topics from navigational and economic rights, to the conservation of marine life and the protection of the sea against pollution. The result of the third United Nations Conference on the Law of the Sea, UNCLOS, was signed on 10 December 1982 and became effective in1994.[67]

The doctrine of "freedom of the seas" or *mare liberum* ("free sea") has been an established principle in international law since the 17th century that guarantees absolute freedom of navigation in the high seas, unless an international agreement provides otherwise. According to the doctrine, a nation's rights and jurisdictions over the ocean are limited to a "narrow belt of sea surrounding a nation's coastline" beyond which was a "free for all [zone] belonging to none."[68] Referred to as the "cannon-shot" rule corresponding to the firing range of land based cannons in the 18th century, a country's territorial waters were traditionally pegged at three nautical miles from the coastline.[69] Under UNCLOS, three miles was replaced with the 12-mile territorial sea limit where States may "enforce any [domestic] law, regulate any use and exploit any resource."[70] In addition, UNCLOS grants coastal States an "exclusive economic zone" (EEZ) of up to 200 miles from the shore, recognising their "right to exploit, develop, manage

[65] Richard Saunier and Richard Meganck, *Dictionary and Introduction to Global Environmental Governance* (Earthscan, 2009)
[66] Daniel Hollis and Tatiana Rosen, *United Nations Convention on the Law of the Sea (UNCLOS), 1982* <http://www.eoearth.org/view/article/156775/>
[67] *United Nations Convention on the Law of the Sea*, opened for signature 10 December 1982, 1833 UNTS 3 (entered into force 16 November 1994). Article 308(1) states: This Convention shall enter into force 12 months after the date of deposit of the sixtieth instrument of ratification or accession.
[68] Division of Ocean Affairs and Law of the Sea, 'The United Nations Convention on the Law of the Sea: A Historical Perspective' (Office of Legal Affairs, United Nations, 1998).
[69] H Kent, 'The Historical Origins of the Per-Erik Olsson, Carl Folke and Firket Berkes Mile Limit' (1954) 48(4) *The American Journal of International Law* 537.
[70] Division of Ocean Affairs and Law of the Sea, above n 5 at 6. The *United Nations Convention on the Law of the Sea*, art. 3 states: "Every State has the right to establish the breadth of its territorial sea up to a limit not exceeding 12 nautical miles, measured from baselines determined in accordance with this Convention."

and conserve all resources – fish or oil, gas or gravel, nodules or sulphur – to be found in the waters, on the ocean floor and in the subsoil" within the EEZ.

In the case of the Republic of Vanuatu, it is classified as an archipelago under the definition provided by Article 46. In accordance with Article 49, the sovereignty over archipelagic waters extends to the sea-"bed and subsoil and the resources contained therein." [71]

4.1 UNCLOS and climate change

When UNCLOS was negotiated, climate change had not yet become part of the politico legal landscape, therefore the Convention does not explicitly refer to it.[72] however, Part XII 'Protection and Preservation of the Marine Environment' can be applied. Article 192 stipulates that all States have an obligation to protect and preserve the marine environment.[73] Article 194 requires States to prevent pollution from 'any source'[74] including "the release of toxic, harmful or noxious substances, especially those which are persistent, from land-based sources, from or through the atmosphere or by dumping."[75] This protection is extended to the prevention of trans-boundary harm, in accordance with Article 194(2) "States shall take all measures necessary to ensure that activities under their jurisdiction or control are so conducted as not to cause damage by pollution to other States and their environment, and that pollution… does not spread beyond the areas where they exercise sovereign rights in accordance with this Convention."[76] While not directly referring to climate change, these provisions, when read together, suggest their intention is to prevent destruction of the marine environment from trans-boundary harm. This could be interpreted as harm originating from sources, such as greenhouse gasses.

[71] Ibid at 8. The *United Nations Convention on the Law of the Sea*, art 57 states: "The exclusive economic zone shall not extend beyond 200 nautical miles from the baselines from which the breadth of the territorial sea is measured;" while art 55 states: "In the exclusive economic zone, the coastal State has: (a) sovereign rights for the purpose of exploring and exploiting, conserving and managing the natural resources, whether living or non-living, of the waters superjacent to the seabed and of the seabed and its subsoil, and with regard to other activities for the economic exploitation and exploration of the zone, such as the production of energy from the water, currents and winds; (b) jurisdiction as provided for in the relevant provisions of this Convention with regard to: (i) the establishment and use of artificial islands, installations and structures; (ii) marine scientific research; (iii) the protection and preservation of the marine environment."
[72] Alan Boyle, 'Law of the Sea Perspectives on Climate Change' (2012) 27 *International Journal of Marine and Coastal Law* 831-838, 831.
[73] *United Nations Convention on the Law of the Sea*, opened for signature 10 December 1982, 1833 UNTS 3 (entered into force 16 November 1994) art 192
[74] Ibid art 194(1).
[75] Ibid art 194(3)(a).
[76] Ibid art 194(2).

4.2 Climate change and the International Tribunal for the Law of the Sea (ITLOS)

There is a growing interest in finding possible causes of action for climate change damage in existing international law tribunals, among them the International Tribunal for the Law of the Sea (ITLOS) established under UNCLOS.[77] The jurisdiction of the Tribunal comprises "all disputes concerning the interpretation or application of the Convention."[78] UNCLOS has 165 State parties, with the latest party, Timor-Leste, acceding on 8 January 2013. Under UNCLOS, parties are required to "prevent, reduce and control pollution of the marine environment from any source."[79] The prohibition includes the "release of toxic, harmful or noxious substances, especially those that are persistent,[80] [whether] "from land-based sources [or] through the atmosphere."[81] Under UNCLOS, States must adopt all measures necessary "to ensure that activities under their jurisdiction are conducted in a manner that does not cause pollution damage to other States and their environment."[82] Article 235 states that "[s]tates are responsible for the fulfilment of their international obligations concerning the protection and preservation of the marine environment. They shall be liable in accordance with international law."[83]

4.3 Customary law, UNCLOS and other international legal instruments

Article 51 of UNCLOS includes customary law, noting that the traditional fishing rights of archipelagic States should be recognised. This is further supported by various other conventions and treaties and protocols. For example, Article 8(j) of the *Convention on*

[77] *United Nations Convention on the Law of the Sea*, opened for signature 10 December 1982, 1833 UNTS 3 (entered into force 16 November 1994) Part XV.
[78] The International Tribunal for the Law of the Sea website, http://www.itlos.org/index.php?id=11&L=0 (last visited 28 December 2013). The Tribunal's jurisdiction is subject to "the provisions of article 297 and to the declarations made in accordance with article 298 of the Convention." Nonetheless, "Article 297 and declarations made under article 298 of the Convention do not prevent parties from agreeing to submit to the Tribunal a dispute otherwise excluded from the Tribunal's jurisdiction under these provisions (Convention, article 299). The Tribunal also has jurisdiction over all disputes and all applications submitted to it pursuant to the provisions of any other agreement conferring jurisdiction on the Tribunal." (Ibid.)
[79] *United Nations Convention on the Law of the Sea*, opened for signature 10 December 1982, 1833 UNTS 3 (entered into force 16 November 1994) art. 194(1).
[80] Ibid art. 194(3).
[81] Ibid art. 194(3).
[82] William Burns, *Potential Causes of Action for Climate Change Damages in International Fora: The Law of the Sea Convention*, 2 McGill International Journal of. Sustainable Development Law and Policy 1 (2006).
[83] *United Nations Convention on the Law of the Sea*, opened for signature 10 December 1982, 1833 UNTS 3 (entered into force 16 November 1994) art. 235.

Biological Diversity (CBD) encourages contracting parties to "respect, preserve and maintain the knowledge, innovations and practices of Indigenous and local communities embodying traditional lifestyles relevant for the conservation and sustainable use of biological diversity." [84] While the *International Labour Organization (ILO) Convention 169*[85] contains various provisions applying to tribal peoples and indigenous peoples. Article 2 provides that States should promote the full realization of "…customs and traditions and their institutions."[86] Article 8 states that "In applying national laws and regulations to the peoples concerned, due regard shall be had to their customs or customary laws."[87] The *United Nations International Declaration on the Rights of Indigenous People* [88] Article 27 includes provision for State "…recognition to indigenous peoples' laws, traditions, customs and land tenure systems…".[89] While Article 34 states that "Indigenous peoples have the right to promote, develop and maintain their institutional structures and their distinctive customs, spirituality, traditions, procedures, practices and, in the cases where they exist, juridical systems or customs, in accordance with international human rights standards." [90] Article 40 indicates that resolution of conflicts and disputes "… shall give due consideration to the customs, traditions, rules and legal systems of the indigenous peoples concerned and international human rights."[91] *The Nagoya Protocol* [92]is a further guiding tool and international agreement aimed at equitable benefit sharing arising from TEK and genetic resources. Article 12 acknowledges that "Parties shall in accordance with domestic law take into consideration indigenous and local communities' customary laws, community protocols and procedures, as applicable, with respect to traditional knowledge associated with genetic resources".[93]

---

[84] *Convention on Biological Diversity* (Rio de Janeiro) 5 June 1992 (entered into force 29 December 1993) 31 ILM 822 (1992).
[85] International Labor Organization, *Indigenous and Tribal Peoples Convention,* C169 7 June 1989, (entered into force 5 September 1991) 1650 UNTS 383 (1989).
[86] Ibid art 1.
[87] Ibid art 8.
[88] Ian Brownlie, *Principles of International Law* (Oxford, 8th ed, 2012) 15.
[89] Ibid.
[90] *United Nations Declaration on the Rights of Indigenous Peoples,* GA Res 61/295, UN GAOR, 61st sess, 107th plen mtg, Supp No 49, UN Doc A/RES/61/295 (13 September 2007) art 34.
[91] Ibid art 40.
[92] *Protocol on the Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from Their Utilization to the Convention on Biological Diversity* (Nagoya) 29 October 2010 (entered into force 12 October 2014).
[93] Ibid art 12.

5. State Law: Constitutions, customary law and fisheries management in the South Pacific Region

Under UNCLOS, States have the responsibility to create legislation for areas including "rules and practices that determine the composition and functions of the organs of central and local government in a State and regulate the relationship between the individual and the State."[94] Some States, such as those located in the South Pacific Region, incorporate customary law in to their constitutions. The following summaries identify customary law inclusions within South Pacific nations constitutions generally, and pertaining to marine ecosystems. Noting at least twelve constitutions that make reference to customary law,[95] Tonga being an exception.

5.1 Examples- Constitutions of the Republic of Palau, Samoa, Fiji, Tuvalu and Nauru

The Constitution of the Republic of Palau *1979* formally recognises the equal authority of both State and customary law. Additionally, it establishes the principle that both must be observed in the event of conflict. Article 5, Section 2 of Palau's Constitution states: "Statutes and traditional law shall be equally authoritative. In case of conflict between a statute and a traditional law, the statute shall prevail only to the extent it is not in conflict with the underlying principles of the traditional law."[96]

The *Constitution of the Independent State of Samoa*[97] provides that all existing laws that were in force prior to independence remain until they are superseded by new State law[98]. This is inclusive of customary law, British, Germanic and New Zealand Laws.[99] Customary laws that have retained recognition include customary fishing rights, land and water use practices, and rights relating to responsibilities for management and regulation of fishing activities.[100] Importantly, under Article 104(1) land below the high water mark is subject to control by the government of Samoa.

---

[94] Elizabeth Martin and Jonathan Law, *A Dictionary of Law* (Oxford University Press, 6th ed, 2006).
[95] Cuskelly, above n 5, 18.
[96] Constitution of the Republic of Palau 1979 art V s 1
[97] *Constitution of the Independent State of Samoa 1960* (Samoa).
[98] Ibid art. 114.
[99] Ibid art. 111.
[100] Techera, above n 62, 289.

The *Constitution (Amendment) Act 1997* (Fiji) acknowledges that the government must preserve the ownership of land in accordance with custom.[101] Under Article 186 the Parliament must make provision for the application of customary law in dispute resolution processes.[102] Parliament must also make provision for customary fishing rights and equitable sharing.[103] However, this has, to some extent, been curtailed by the prerogative rights enforced by the Crown under common law for the foreshore and seabed.[104]

No explicit mention of custom has been made in the text of the Constitution, however the *Laws of Tuvalu Act 2008* [Cap 1.06] propose in Section 5 that customary law "shall have effect as part of the law of Tuvalu, except to the extent that it is inconsistent with an Act or an applied law.[105]" Custom is recognised as long as it does not result in "injustice or would not be in the public interest".[106] Of note, Section 6(3)(b) states that the common law is only valid to the extent that it conforms with customary law.

The constitution of Nauru makes no reference to custom. The *Custom and Adopted Laws Act 1971* however provides that customary law remains in force in relation to specific matters addressed by section 3(1). Nowhere is specific fishing rights included in those customary laws, but it could be included under "matters affecting Nauruans only" within the Section 3 customary law exceptions.[107] The Act explicitly adopts "English Law", being all laws "in force in England on the thirty-first day of January, 1968."[108] Specific mention is made under Section 6 "parts of the statute of England which shall not apply within Nauru" for fishing. Fishing appears to be subsumed under the *Nauru Fisheries and Marine Resources Authority Act 1997*, which makes no specific reference to custom.

5.2 The Republic of Vanuatu and customary law

[101] *Constitution (Amendment) Act 1997* (Fiji) art. 6(b).
[102] Ibid art. 186(1).
[103] Ibid art. 186(3).
[104] Techera, above n 62, 283.
[105] *Laws of Tuvalu Act 2008* [Cap 1.06] s 5.
[106] Ibid Schedule 1.
[107] *Custom and Adopted Laws Act 1971* (Nauru)s 3(1)(d).
[108] Ibid s 4(1).

The *Constitution of the Republic of Vanuatu 1990* notes that, until otherwise provided by State law through Parliament, all laws existing at the time of the nation becoming independent (1980), remain in force.[109] If customary law is accepted as part of those laws, then by extension, it remains in force, unless superseded by State law. This provision is further qualified by Article 95(3) that notes, all customary law continues to have effect as part of the law of the Republic of Vanuatu[110]. Support for these provisions is found in reference to justice, if there is no law applicable, the decision will be determined "wherever possible in conformity with custom".[111]

The citizens of Vanuatu, referred to as 'ni-Vanuatu' hold a worldview that is based on "a fundamental belief in the spiritual connections between themselves and the rest of the natural world."[112] Land is an important part of the spiritual connection that ni-Vanuatu have with themselves and the natural world.[113] Article 73 of the Constitution states that "All land in the Republic of Vanuatu belongs to the indigenous custom owners and their descendants."[114] Under the *Land Acquisition Act* [Cap. 215] (Vanuatu) "land includes any estate, any interest in or benefit to land, all things growing on land, houses, buildings, improvements and all other things on land, land beneath water, the seabed extending to the sea side of any offshore reef but no further and the subsoil thereof."[115] In accordance with international law and the provisions under UNCLOS, ni-Vanuatu are provided legal ownership of the sea bed and subsoil. However, under customary law, it has been suggested that the ownership of marine areas extends beyond the sea-bed and should encompass "as far out as fishing or diving can be exploited".[116]

The *Environment Management and Conservation Act 2002* [Cap 283] (Vanuatu) came into force in 2003.[117] The legislation provides for the creation of customary community conservation areas on the provision that its attributes include unique biological, genetic, geological or cultural resources. However, there remains pieces of legislation that subsume

[109] *Constitution of the Republic of Vanuatu 1990* (Vanuatu).
[110] Ibid art. 95(3).
[111] Ibid art. 47(1).
[112] Francis Hickey, 'Traditional Marine Resource Management in Vanuatu: Worldviews in Transformation, Sacred and Profane' in Nigel Haggan, et al (eds.) *Putting Fishers Knowledge to Work* (2003) 117.
[113]Techera, above n 62, 286.
[114] *Constitution of the Republic of Vanuatu 1990* (Vanuatu) art. 73.
[115] *Land Acquisition Act* [Cap. 215] (Vanuatu) Part 1(1).
[116] Techera, above n 62, 287.
[117] *Environmental Management and Conservation Act 2002* (Vanuatu) was assented to on 31 December 2002 and commenced on 10 March 2003.

these customary laws and weaken the power of traditional communities in marine management. For example, legislating both inshore and offshore areas, the *Fisheries Act 2005* implements international obligations. Under the act, consultation with adjoining landowners is the only requirement for establishing marine reserves.[118] Additionally 'Designated fisheries' of national interest are provided with special provisions that take traditional fishing practices and methods into account, but the extent to which these have been enforced is variable.[119]

Despite these limitations, commentators consider that "[a]rguably the Constitution of Vanuatu is the most forceful [of Pacific constitutions] in its advocacy of custom."[120] A unique feature of the Constitution is the "high degree of hybridisation" in its combination of the Western legal system with "the *kastom* chiefly system."[121] Perhaps what is most notable is that Vanuatu consists of both a democratically elected Parliament and a National Council of Chiefs, the *Malvatumauri*."[122] Its establishment was "rooted in both colonial and indigenous practices."[123] While the *Malvatumauri* has no direct legislative power, it may be "consulted on any question, particularly any question relating to tradition and custom, in connection with any bill before Parliament."[124] It may also "make recommendations for the preservation and promotion of ni-Vanuatu culture and languages."[125]

The *Malvatumauri* is composed of custom chiefs, who have been elected by their peers from the District Councils of Chiefs.[126] Although the *Malvatumauri* is limited by a lack of direct legislative power, it plays a constitutionally mandated recommendatory and advisory role to the parliament regarding custom.[127]

[118] Erika Techera 'Enhancing legal frameworks for biodiversity conservation in the Pacific' (2015) *Pacific Conservation Biology* CSIRO, 1-10, 4.
[119] Ibid.
[120] [120] Kenneth Brown, 'Customary Law in the Pacific: An Endangered Species?' (1999) 3 *Journal of South Pacific Law*.
[121] Erika Techera, *Marine Environmental Governance: From International Law to Local Practice* (Routledge, 2012) 164.
[122] Ibid.
[123] Lamont Lindstrom, 'Chiefs in Vanuatu Today' in Geoffrey White and Lamont Lindstrom (eds.) *Chiefs Today: Traditional Pacific Leadership and the Postcolonial State* (1997) 214.
[124] Constitution of the Republic of Vanuatu 1980 art. 30(2).
[125] Ibid art. 30(1).
[126] Ibid art. 29(1).
[127] Ibid art. 30.

In December 2013, a new land reform package and two Constitutional amendments were passed by Parliament. On 30 February 2014, the *Customary Land Management Act* was released and significant amendments were made to the *Land Reform Act.*[128] A constitutional amendment supporting the operation of these laws gave the *Malvatumauri* greater recognition through Article 30 of the Constitution, which was changed to decree that the Parliament must consult the *Malvatumauri* regarding any changes to land law.[129] Additionally, Article 78 was redrafted to enable customary courts to resolve customary ownership of land.[130]

6. Customary Law and State Law: Legal Pluralism

The *Customary Land Management Act* of Vanuatu, provides an example of Legal pluralism which refers to the concept that there can be more than one legal order operating within the broader normative legal framework.[131] There are two ways wherein customary law may be recognised under State law. The first is by way of a formal recognition by the State, which may be done through the constitution, statutes or judicial decisions.[132] The second is the functional recognition of customary law, where the latter is not only formally recognised but subsumed within national law for "particular purposes in defined areas of law."[133] The former creates a regime of legal pluralism, while the latter results in the incorporation of customary law into State law.[134] An advantage of the formal legal pluralist approach is that it keeps customary law distinct and separate from mainstream State law. However legal pluralism may also create a conflict of laws paradigm, where it may be difficult to resolve disputes and/or implement rulings. To add to this challenge, customary law is often viewed as belonging to a lower normative order.[135] Additionally customary law may be interpreted as uniform for all indigenous communities in the State, resulting in inappropriate applications, such as in situations where traditionally it did not exist.[136]

---

[128] Republic of Vanuatu, Custom Land Management Act No.33 of 2013; Republic of Vanuatu, Land Reform (Amendment) Act No.31 of 2013.

[129] Vanuatu Constitution (Sixth) (Amendment) Act No. 27 of 2013 art. 30.

[130] Ibid art. 78.

[131] Sally Merry, 'Legal Pluralism' (1988) 22(5) *Law and Society Review*, 869-896 at 870.

[132] Miranda Forsyth, 'A Typology of Relationships between State and Non-State Justice Systems,' (2007) 56 *Journal of Legal Pluralism &Unofficial Law.*

[133] Law Reform Commission of Western Australia, *Aboriginal Customary Laws*, Final Report (2006) 71.

[134] Forsyth, above n 133, 70.

[135] Franz von Benda-Beckman, 'Who's Afraid of Legal Pluralism' (2002) 34(47) *The Journal of Legal Pluralism and Unofficial* Law, 37-82 at 52.

[136] International Council on Human Rights Policy 'Research Project on Plural Legal Orders and Human Rights: An Approach Paper' June 2008, 1-20 at 9.

7. Customary law and case law

The significant role customary law plays within Pacific States domestic legal systems pertaining to marine areas and resources is illustrated by the following two cases.

7.1 Case 1- Ulelio v Nelulu Land Group, Papua New Guinea

In *Ulelio v Nelulu Land Group*,[137] the first defendant, Nelulu land Group, claimed absolute ownership over the Aliwo Passage (12.578 hectares of sea in the West New Britain Province) after attaining a certificate of title under the *Land (Tenure Conversion) Act*. The plaintiffs challenged "the validity of the first defendant's ownership of the stated sea area and coastal waters, alleging inter alia fraud."[138]

The PNG National Court of Justice sided with the plaintiffs, holding that although there had been "some recognition of the principles that there may be customary rights to reefs and marine resources",

> at no time was there any recognition of any absolute ownership to the sea for all purposes. Customary rights to the sea under customary law are available within the prescriptions of Schedule 2.2 of the *Constitution*. Customary rights do not include acquiring exclusive possessory title to the sea.[139]

According to the Court, "[t]he sea is a public highway. There is therefore a common domain in the seas and in the coastal seas and within what is referred to as the territorial waters, this domain is held by the State."[140]

7.2 Case 2- Territorial sea under Yap (FS Micronesia) Constitution

In *People of Rull and Gilman (Yap State) v M/V Kyowa Violet* (In Rem Defendant), Kyowa Shipping Co. Ltd,[141] the Supreme Court of the Federated States of Micronesia held, that,

---

[137] Ulelio v Nelulu Land Group [1998] PGNC 176; [1998] PNGLR (26 March 1998).
[138] Ibid.
[139] Ibid.
[140] Ibid.
[141] People of Rull ex rel Ruepong v MV Kyowa Violet [2006] FMSC 53; 14 FSM Intrm. 403 (Yap. 2006) (21 September 2006).

> [w]hen the plaintiffs 'own' the natural resources through the *tabinaw*, the plaintiffs' exclusive rights to use and exploit the marine resources of the area affected by a grounding and subsequent oil spill give them standing to maintain a class action with respect to the issues at trial – damages to the marine resources from the grounding and oil spill.[142]

The Court cited the Yap Constitution's provision that the State "recognizes traditional rights and ownership of natural resources and areas within the marine space of the State within 12 miles from island baselines".[143] It further cited Yap statutory law's provision that "traditionally recognized fishing rights [and] existing private rights of action for civil damages, for damage to coral reefs, seagrass areas and mangroves….must be preserved and respected".[144]
According to the Court, these traditional rights and ownership, stemming from the *tabinaw*, the traditional patrilineal Yapese family group, provided the people of Yap State with "the rights to use and exploit, to the exclusion of all others, the marine resources of particular areas of the submerged lands inside the fringing reef around Yap". It recognised that "a *tabinaw* is more than a concept", for it "includes an estate in identifiable land and specific areas within the Yap fringing reef within which a *tabinaw* member can exploit the marine resources. A *tabinaw* member can only exploit marine resources in the marine area that appertains to his *tabinaw*. Each village includes a number of *tabinaw*." [145]

These two cases demonstrate a changing trend, that customary law can be recognised at a State level.

PART 3 – MANAGEMENT

To date this paper has presented the scientific evidence verifying the challenges climate change presents to marine ecosystems. This unfolding crisis that will particularly affect food security in SIDs demands responsive legislation and management. Part two of this paper discussed international and domestic legal frameworks governing marine ecosystems, particularly

[142] Ibid.
[143] Ibid.
[144] Ibid.
[145] Ibid.

focusing on customary law as a potential legal platform to support contemporary adaptive management. Part three completes the narrative, as it examines the role of customary law and practices in management solutions.

8. Customary Practices and Traditional Ecological Knowledge in Fisheries Management

In many cases, customary law, may be most appropriately applied to environmental management at a local level. As it is embedded in local culture, well suited to the community structure and meets community goals and compliance. These social and cultural factors can all improve conservation outcomes. Community engagement with customary management practices is likely to be higher due to the fear of customary penalties. Enforcement of customary law is usually the responsibility of the land-owner or village chief[146] who levels "Fines and threats of supernatural retribution" at those breaching the rules.[147] In addition, social alienation, violence, gossiping and other forms of social pressure within the community are all viewed as penalties for the violation of certain customary management practices.[148]

Customary practices include management strategies designed to regulate access to marine resources and their use. These practices are informed by traditional ecological knowledge and enforced by governance structures that have been determined by customary law.[149] Customary fisheries management practices consist of spatial, temporal, effort, catch, species and gear restrictions.[150] A number of studies provide evidence that such restrictions lead to ecological benefits.[151] However, others have suggested short-term closures provide minimal benefits.[152] Customary fisheries management goals are not purely for conservation. They include taming fish to make them easier to catch, the provision of food for wedding, birth or funeral feasts,

[146] Cinner and Aswani, above n 6, 205.
[147] Techera, 'Enhancing legal frameworks for biodiversity conservation in the Pacific', above n 117, 2.
[148] Cinner and Aswani, above n 6, 205.
[149] Joe McCarter, Michael Gavin 'In Situ Maintenance of Traditional Ecological Knowledge on Malekula Island, Vanuatu' (2014) 27 *Society and Natural Resources*, 1115-1129; Techera, 'Enhancing legal frameworks for biodiversity conservation in the Pacific', above n 117, 2.
[150] Cinner and Aswani, above n 6.
[151] Timothy R. McClanahan, Michael J. Marnane, Joshua E. Cinner, and William E. Kiene, 'A Comparison of Marine Protected Areas and Alternative Approaches to Coral-Reef Management' (2006) 16 *Current Biology* 1406-1413; Sophal Chhun, Viktoria Kahui, Henrik Moller, and Paul Thorsnes, 'Advancing Marine Policy Toward Ecosystem-Based Management by Eliciting Public Preferences' (2015) 30(3) *Marine Resource Economics* 261-275, 264.
[152] Gaya Gnanalingam and Chris Hepburn, 'Flexibility in temporary fisheries closure legislation is required to maximize success' (2015) 61 *Marine Policy* 39-45, 40.

and the gifting of food to reinforce inter-community relations or mitigate conflict.[153] Some of these aims may conflict with western management goals for sustainable development. Despite these limitations, Michelle Lam points out that customary management systems make allowances for changes in local circumstances that can be useful in fisheries management.[154]

For example, In Vanuatu, customary laws are enforced in relation to fishing to provide marine resources with the opportunity to recover. In particular, there are *tabu* areas, that are 'no-take' zones that involve harvesting prohibitions. These zones are often put in place by a chiefly authority, marked with tabu sticks and/or leaves and ritualized. Breaching the rules of these areas leads to fines and supernatural retribution, described as Black Magic. In addition to these 'no go zones' there are customary legal mechanisms controlling who can fish, where, when, and the quantity and species of fish they can harvest.[155] Alternatively, in an area of partial depletion, the chief may ban all net fishing and only permit rod fishing, as a management method of limiting the number of fish extracted.

Fiji and Kiribati also have *tabu* areas, while other Pacific islands similarly restrict fishing in locally named zones, such as the "the *ra'ui* in the Cook Islands, the *kapu* in Hawaii, the *tambu* in PNG, the *bul* in Palau, the *mo* in the Marshall Islands, the *tapu* in Tonga and the *rahui* in New Zealand (Maori)."

In his study of village-based marine management, Robert Johannes argued that the emphasis traditional practices place on maximising harvest yield over conservation means the "Management of marine resources by traditional villagers does not guarantee their sound use."[156] According to Johannes, a lack of scientific information in local communities and an insufficient skill-base to address formulate management strategies and address 'best management practice' could further contribute to the mismanagement of fisheries and resources.[157] Similarly, looking at legal frameworks for biodiversity, Erika Techera has found that "many traditional practices were not specifically aimed at biodiversity conservation, but focused upon improving harvests and achieving broad socioeconomic and cultural benefits…..

[153] McClanahan et al, 1406.
[154] Lam, above n 57.
[155] Techera, 'Enhancing legal frameworks for biodiversity conservation in the Pacific', above n 117, 88.
[156] Robert Johannes 'Government-supported, village-based management of marine resources in Vanuatu' (1998) 40(2) *Ocean and Coastal Management* 165-186, 165.
[157] Ibid.

…….".[158] She argued that in Vanuatu "traditional ecological knowledge and customary management mechanisms are directed more at improving the harvesting of marine resources than conserving them."[159]

Nonetheless, while it is not under a Western ideal of protection for protection's sake, this paper argues that customary marine management provides a *de facto* protection of the marine environment. Evidence of this is provided by a scientific study conducted that has compiled data from more than 25,000 reefs in over 46 States to identify coral ecosystem 'outliers'[160]. The outliers are 'bright spots' and 'dark spots' that are substantially better or worse than expected, given the environmental conditions and socioeconomic drivers they have been exposed to. Significantly, the data shows that bright spots do not always appear in remote areas with low fishing pressure and beneficial environmental conditions. In fact, bright spots are generally areas of high use "characterized by strong sociocultural institutions such as customary taboos and marine tenure, high levels of local engagement in management, [and] high dependence on marine resources"[161]. One bright spot, the authors cite, is Karkar Island, Papua New Guinea, where an adaptive rotational harvest system, and a marine tenure that excludes fishers from other villages, together with initiation rites limiting entry into particular fisheries, restrict marine resource use.[162] This data adds to a growing body of research that suggests the long-term viability of ecosystems will depend on local populations willingly cooperating in the collective management of marine resources.[163]

In summary, whether customary marine management is designed for the purposes of conservation or not, it offers the marine environment a form of *de facto* protection that is supported by local communities who are both culturally and practically invested in its long term viability. The task is now to combine these practices with elements of sustainable

---

158 Techera, 'Enhancing legal frameworks for biodiversity conservation in the Pacific', above n 117, 89.

159 Techera, above n 62, 286.

160 Joshua E. Cinner et al, 'Bright Spots Among the World's Coral Reefs' (2016) 535 *Nature* 416.

161 Ibid.

162 Ibid 418.

163 Carl T. Folke et al, 'Adaptive Governance of Social-ecological Systems' (2005) 30 *Annual Review of Environment and Resources* 441-73; Heenan et al, above n 18; Per Olsson et al, 'Adaptive Comanagement for Building Resilience in Social-ecological Systems' (2004) 34 *Environmental Management* 75-90; Rebecca Weeks and Stacy D. Jupiter, 'Adaptive Comanagement of a Marine Protected Area Network in Fiji' (2013) 27(6) *Conservation Biology* 1234-44.

development to improve the adaptive capacity of the ni-Vanuatu, and other Pacific Island populations, in the face of climate change variability.

9. The Adaptive Co-management Approach

While traditional knowledge may sometimes dismissed be as 'unscientific', Cinner and Aswani list the varied ways that traditional approaches parallel modern fisheries management. They argue that hybrid management approaches would benefit from a greater governance decentralisation so that local customary practices can be effectively integrated.[164]
Co-management, or hybrid governance, is a governance strategy involving the sharing of rights and responsibilities among those who have a claim to an environment or natural resource.[165] It can also be described as adaptive co-management (ACP) which has received considerable recent attention as a means of sustaining socio-ecological systems by building their resilience and adaptive capacity and establishing sustainable pathways.[166] Ryan Plummer found that ACM can contribute to climate change adaption by building generalised adaptive capacity (characteristics that promote the ability to respond to almost any kind of challenge), as well as providing a novel institutional arrangement to generate adaptive responses.[167]

There is a clear need to integrate current conservation and management procedures with local customary practices, few countries have achieved a hybrid approach due to the differences, between Western and customary approaches, in their conceptual underpinnings, intent, and application. However, this trend is changing. The ACP approach has been in practice in Vanuatu since 1990. Moses Amos, a trochus specialist with the Fisheries Department, offered advice on trochus management to fishing rights owners on their request. He and has team had much support and commenced the process of conducting trochus surveys on village fishing grounds. They provided the villagers with information on trochus and advice, such as, where to situate trochus refuges and why minimum catch limits on trochus is desirable. They

---

[164] Cinner and Aswani, above n 6.

[165] Olsson et al, above n 162; R. Plummer and D. Armitage, 'A Resilience-based Framework for Evaluating Adaptive Co-management: Linking Ecology, Economy and Society in a Complex World' (2007) 61 *Ecological Economics* 62; C. Fabricius, C. Folke, G. Cundill and L. Schultz, 'Powerless Spectators, Coping Actors, and Adaptive Co-managers: A Synthesis of the Role of Communities in Ecosystem Management' (2007) 12:1 *Ecology and Society* 29.

[166] Olsson et al, above n 162; Plummer and Armitage, above n 164; Fabricius et al, above n 164.

[167] Ryan Plummer, 'The Adaptive Co-Management Process: an Initial Synthesis of Representative Models and Influential Variables' (2009) 12:2 *Ecology and Society* 24.

discussed how long trochus fisheries should be closed so stocks could rebuild. The approach was deliberately informal: "Every evening, after each day's diving, the Research Officers arrange for further informal discussions with resource owners and fishermen, about the importance of harvesting only legal size shells (These discussions are usually held around bowls of kava)"[168]. Other examples of ACP are: Samoa which has drafted local by-laws to create community-owned protected areas while simultaneously training locals to monitor and manage local biodiversity[169] and the Kubulau District of Fiji which has adopted the ACM approach across the marine protected area network.[170]

This paper proposes that a hybrid approach can be achieved if existing customary law and fisheries management systems are treated as dynamic and adaptive. Part of the key to such an approach is community education that integrates science and traditional ecological knowledge.[171] The customary management approach can then become a hybrid of the conservation goals of the State centric (Western) approach and the localised customary practices. This approach aims to synthesise customary law's adaptive procedures with contemporary conservation techniques to ensure optimal natural resource conservation results with cost effective monitoring and enforcement solutions. In a marine context, hybrid management regimes involve the integration of TEK (custom) with modern fisheries management strategies (Western). These regimes typically involve both customary and State governance systems, including sanctions to implement management strategies for marine resources[172] in Marine Protected Areas (MPAs).[173] MPAs can provide a bridge between traditional 'no take zones' and Western ideas of sustainable development. They prevent the exploitation of some marine ecosystems, so providing 're-charge' stations for marine life[174].

9.1 Adaptive co-management

[168] Johannes, above n 155, 165; Vicki Vaartjes, Quentin Hanich and Aurelie Delisle, *Empowering Community-Based Ecosystem Approaches to Fisheries Management: Strategies for Effective Training & Learning* (University of Wollongong, 2015).
[169] Erika Techera, 'Samoa: Law, custom and conservation' (2006) 10 *New Zealand Environmental Law Journal, Annual* 361.
[170] Weeks and Jupiter, above n 150, 1234.
[171] Cinner and Aswani, above n 6, 211.
[172] Ibid.
[173] Lam, above n 57.
[174] Ibid 102.

Modern management strategies are often centred around 'co-management', that is "the sharing of responsibility and authority between the State and resource users".[175] Co-management can "strengthen the potential of customary management to protect both the local environment and the stakes and rights of resource-users while improving the legitimacy of State involvement in fisheries management through more inclusive and transparent decision-making processes."[176]

A participatory or community based approach to the governance of marine resources was adopted in Vanuatu after the government realised that the centralised management approach was prohibitively expensive, hence unlikely to succeed.[177] The evidence of the benefits of such an approach were described by Techera as she discussed the traditional collection of trochus by communities in Vanuatu. She outlined how their management is governed by customary law that incorporates *tabu*. "The trochus are harvested for their shells, which are used for buttons and ornaments and ground down and used as a component in some lacquers. These traditional marine management practices were boosted by governmental endorsement, and the cooperative approach allowed information to flow both ways and traditional knowledge to be combined with western scientific data. Under the scheme the villagers remained in control of their customary fishing grounds and they decided whether or not to impose fishing bans or restrictions, and the form these would take."[178]

10. Conclusion

Fragile marine ecosystems are particularly vulnerable to climate stressors.[179] The science is predicting that the impacts of climate change will result in major consequences for these ecosystems jeopardising food security for SIDS subsistence communities, such as those across the South Pacific region that are dependent on fish for protein.[180] There is an urgent need to identify and adopt contemporary adaptive management approaches to protect vulnerable

[175] Louisa Evans, Nia Cherrett, Diemuth Pemsl 'Assessing the impact of fisheries co-management interventions in developing countries: A meta-analysis' (2011) 92 *Journal of Environmental Management* 1938-1949, 1938
[176] Ibid.
[177] Johannes, above n 155.
[178] Erika Techera, *Environmental Governance, From International Law to Local Practice* (Routledge 2012) 219.
[179] Sarah Teck et al., 'Using Expert Judgment to Estimate Marine Ecosystem Vulnerability in the California Current' (2010) 20(5) *Ecological Applications* 1402-1416; Cathryn Murray, Selina Agbayani and Natalie Ban 'Cumulative Effects of Planned Industrial Development and Climate Change on Ecosystems' (2015) 4 *Global Ecology and Conservation* 110-116, 114.
[180] Guillotreau et al, above n 2, 290.

marine ecosystems and ensure their long-term viability supporting the livelihoods of local communities. The importance of addressing this problem globally has been highlighted through SDG's 13 and 14.[181]

International and domestic law, education, technology and governance all have roles to play in protecting marine resources. However, Western conservation management strategies, such as sanctioning marine reserves, are often ineffective in SIDS due to "low levels of enforcement, monitoring and compliance". [182]Indeed, it is now well recognised that marine efforts in SIDS fail, if their cultural and socio-economic features, are not considered. [183]

This paper has argued that customary law and practices hold a key to successful marine management strategies, in response to the unprecedented impacts of climate change. This is because they are deeply rooted in local communities, landscapes and seascapes, that are adapting over time to meet cultural and social needs, such as the provision of food. Legal instruments provide governance structures for environmental management. Some of these recognise customary law and traditional ecological knowledge, such as UNCLOS and many of the constitutions across South Pacific nations. However questions have been raised regarding the barriers to implementing these inclusions on domestic scales, [184] particularly in the context of climate change. For example, UNCLOS does not refer specifically to climate change as it was not a consideration at the time of its development. Rather it aims to prevent the destruction of the marine environment from trans-boundary harm, which could be interpreted as harm originating from sources, such as greenhouse gasses. [185]

---

[181] *Progress towards the Sustainable Development Goals – Report of the Secretary-General,* Agenda items 5, 6 and 18(a), 75th sess, UN Doc E/2016/75 (27 July 2016) 17-18.

[182] Josh Cinner et al, 'Periodic Closures as Adaptive Coral Reef Management in the Indo-Pacific' (2005) 11(1) *Ecology and Society* 31; Tim McClanahan, 'Is There a Future for Coral Reef Parks in Poor Tropical Countries' (1999) 18 *Coral Reefs* 321-25; Richard B. Pollnac et al, 'Discovering Factors that Influence the Success of Community-based Marine Protected Areas in the Visayas, Philippines' (2001) 44 *Ocean and Coastal Management* 683-710.

[183] Patrick Christie et al, 'Toward Developing a Complete Understanding: A Social Science Research Agenda for Marine Protected Areas' (2003) 28(12) *Fisheries* 22-26; Elinor Ostrom, *Governing the Commons: The Evolution of Institutions for Collective Action* (Cambridge University Press, 1990); Jules Pretty, 'Social Capital and the Collective Management of Resources' (2003) 302 *Science* 1912-14.

[184] Techera, above n 62, 280.

[185] Sanier and Meganck, above n 64.

The effectiveness of customary marine management has been questioned by some scholars,[186] as it is perceived to serve social and cultural purposes that may be contradictory to Western views of conservation goals. Nonetheless, it can be argued that these very social and cultural purposes, result in improved and sustainable environmental outcomes, without the high levels of financial investment that have been required in the past. [187] Josh Cinner et al observed that, "social, economic, and cultural factors influence whether individuals and communities create incentives to overexploit common-property resources or, alternatively, cooperate to successfully manage them".[188]

Enforcement of customary law, at a local level, offers important governance opportunities, such as; effective community monitoring and the application of appropriate sanctions and penalties. Communities are rewarded by receiving direct benefits through the sustainable provision of seafood. This position is backed by scientific evidence, including that from the first *World Ocean Assessment* [189] and the 2016 study, *Bright Spots Among the World's Coral Reefs* [190] which found that the of the 25,000 coral reefs studied from over 46 States, those in the best ecological state were managed by subsistence communities.

This paper does not propose that a customary marine management approach should replace Western management strategies. Rather, customary traditions could be employed within a broader schema of legal and management frameworks responding adaptively to the detrimental impacts of climate change. This emerging trend can be seen in counties such as Vanuatu, Fiji and Samoa.

The scientific evidence surrounding climate change, coupled with observations of a weakness regarding implementing existing laws 'on the ground', indicates that it is time that this situation is amended. UNCLOS, along with other legal instruments that support the protection of nature, now require specific inclusions supporting the adaptive co-management approach to address climate change adaptation. As communities globally grapple to respond to climate change damage to all ecological systems, there is much to be learnt from Pacific Island communities

[186] Johannes, above n 155, 165.
[187] Cinner et al, 'Periodic Closures as Adaptive Coral Reef Management in the Indo-Pacific', above n 181, 31.
[188] Ibid.
[189] Office of Legal Affairs, *The First Global Integrated Marine Assessment: World Ocean Assessment 1,* (21 January 2016) Oceans and Law of the Sea: United Nations http://www.un.org/Depts/los/global_reporting/WOA_RPROC/WOACompilation.pdf 4.
[190] Cinner et al, above n 159.

and their inseparable interconnections with nature. This highlights the need to empower and involve indigenous peoples and their customs more broadly, in the protections of ecosystems and their services.

Reference List

Ardron, Jeff, Malcolm R. Clark, Andrew J. Penney, Thomas F. Hourigan, Ashley A. Rowden, Piers K. Dunstan, Les Watling, Timothy M. Shank, Di M. Tracey, Mathew R. Dunn, Steven J. Parker, 'A Systematic Approach Towards the Identification and Protection of Vulnerable Marine Ecosystems' (2014) 49 *Marine Policy* 146-154

Badjeck, Marie-Caroline, Edward H. Allison, Ashley S. Halls, Nicholas K. Dulvy, 'Impacts of climate variability and change on fishery-based livelihoods' (2010) 34 *Marine Policy* 375-383

Barange, Manuel, G. Merino, J. L. Blanchard, J. Scholtens, J. Harle, E. H. Allison, J. I. Allen, J. Holt & S. Jennings, 'Impacts of climate change on marine ecosystem production in societies dependent on fisheries' (2014) 4 *Nature Climate Change* 211-216

Barnett, J. and Webber, M., 'Migration as Adaptation: Opportunities and Limits' in Jane McAdam (ed), Climate Change and Displacement Multidisciplinary Perspectives (2010) Hart Publishing

Bell, Johann D., Neil L. Andrew, Michael J. Batty, Lindsay B. Chapman, Jeffrey M. Dambacher, Brian Dawson, Alexandre S. Ganachaud et al. "Adapting tropical Pacific fisheries and aquaculture to climate change: management measures, policies and investments." *Vulnerability of Tropical Pacific Fisheries and Aquaculture to Climate Change. Secretariat of the Pacific Community, Noumea, New Caledonia* (2011): 803-876.

Benda-Beckman, Franz von, 'Who's Afraid of Legal Pluralism' (2002) 34(47) *The Journal of Legal Pluralism and Unofficial* Law, 37-82

Bernhardt, Joanna R. and Heather M. Leslie, 'Resilience to Climate Change in Coastal Marine Ecosystems' (2013) 5 *Annual Review Marine Science* 371-392

Berry, Thomas, 'Legal Conditions for Earth's Survival' in Mary-Evelyn Tucker (ed), *Evening Thoughts: Reflections on Earth as Sacred Community* (Sierra Club, 2006)

Bell, Johann D. Mecki Kronen, Aliti Vunisea, Warwick J. Nash, Gregory Keeble, Andreas Demmke, Scott Pontifex, Serge Andréfouët, 'Planning the use of fish for food security in the Pacific' (2006) 33 *Marine Policy* 64-76

Blanchard, Julia, Simon Jennings, Robert Holmes, James Harle, Gorka Merino, J. Icarus Allen, Jason Holt, Nicholas K. Dulvy and Manuel Barange, 'Potential consequences of climate change for primary production and fish production in large marine ecosystems' (2012) 367 *Philosophical Transactions of the Royal Society* 2979-2989

Bledsoe, Robert and Boleslaw Boczek, *The International Law Dictionary* (ABC-Clio, Inc. and Clio Press Ltd, 1987)

Bolton, Lissant, *Unfolding the Moon: Enacting Women's Kastom in Vanuatu* (*Honolulu University of Hawaii Press*, 2003)

Boyle, Alan, 'Law of the Sea Perspectives on Climate Change' (2012) 27 *International Journal of Marine and Coastal Law* 831-838

Brander, Keith, 'Global Fish Production and Climate Change' (2007) 104(50) *Proceedings of the National Academy of Sciences of the United States of America* 19709-19714

Brander, Keith, 'Impacts of Climate Change on Fisheries' (2010) 79 *Journal of Marine Sciences* 389-402

Brierley, Andrew S. and Michael J. Kingsford, 'Impacts of Climate Change on Marine Organisms and Ecosystems' (2009) 19(14) *Current Biology* R602–R614

Brown, Kenneth, 'Customary Law in the Pacific: An Endangered Species?' (1999) 3 Journal of South Pacific Law

Burns, William, *Potential Causes of Action for Climate Change Damages in International Fora: The Law of the Sea Convention*, (2006) 2 McGill International Journal of. Sustainable Development Law and Policy 1

Caputi, N. et. al., 'Fisheries Research Report No. 213 ' (2010) Department of Fisheries, Government of Western Australia

Chhun, Sophal, Viktoria Kahui, Henrik Moller, and Paul Thorsnes, 'Advancing Marine Policy Toward Ecosystem-Based Management by Eliciting Public Preferences' (2015) 30(3) *Marine Resource Economics* 261-275

Cinner, Joshua, 'Coral Reef Livelihoods' (2014) 7 *Current Opinion in Environmental Sustainability* 65-71

Cinner, Joshua, Shankar Aswani, 'Integrating Customary Management into Marine Conservation' (2007) 140 *Biological Conservation* 201-216

Cinner, Joshua E., Timothy R. McClanahan, Tim M. Daw, Nicholas A.J. Graham, Joseph Maina, Shaun K. Wilson, and Terence P. Hughes, 'Linking Social and Ecological Systems to Sustain Coral Reef Fisheries' (2009) 19 *Current Biology* 206-212

Cinner, Joshua E., T.R. McClanahan, N.A.J Graham, T.M. Daw, J. Maina, S.M Stead, A Wamukota, K. Brown, Ö. Bodin 'Vulnerability of coastal communities to key impacts of climate change on coral reef fisheries' (2012) 22 *Global Environmental Change* 12-20

Corrin, J. and Paterson, D., Introduction to South Pacific Law (2007) Routledge

Cox, Michael, Sergio Villamayor-Tomas and Yasha Hartberg, 'The Role of Religion in Community-based Natural Resource Management' (2014) 54 *World Development* 46-55

CSIRO Climate Adaptation National Research Flagship, 'Marine Climate Change in Australia: Impacts and Adaptation Responses' (2009) National Climate Change and Adaptation Research Facility –NCCARF

Cullwick, Jonas ‘Changes To Vanuatu Malvatumauri Council Needed: Chiefs 30 Leaders Call for Amendments to allow Greater Recognition,’ Vanuatu Daily Post, 8 October 2013

Cuskelly, Katrina, *Customs and Constitutions: State Recognition of Customary Law around the World*, (International Union for Conservation of Nature and Natural Resources, 2011)

Division of Ocean Affairs and Law of the Sea, 'The United Nations Convention on the Law of the Sea: A Historical Perspective' (Office of Legal Affairs, United Nations, 1998)

Doney, Scott C., Mary Ruckelshaus, J. Emmett Duffy, James P. Barry, Francis Chan, Chad A. English, Heather M. Galindo, Jacqueline M. Grebmeier, Anne B. Hollowed, Nancy Knowlton, Jeffrey Polovina, Nancy N. Rabalais, William J. Sydeman, and Lynne D. Talley, ‘Climate Change Impacts on Marine Ecosystems’ (2012) 4 *Annual Review of Marine Science* 11-37

Drinkwater, Kenneth F., Gregory Beaugrand, Masahide Kaeriyama, Suam Kim, Geir Ottersen, R. Ian Perry, Hans-Otto Pörtner, Jeffrey J. Polovina, Akinori Takasuka, ‘On the processes linking climate to ecosystem changes’ (2010) 79 *Journal of Marine Systems* 374-388

Evans, Louisa, Nia Cherrett, Diemuth Pemsl ‘Assessing the impact of fisheries co-management interventions in developing countries: A meta-analysis’ (2011) 92 *Journal of Environmental Management* 1938-1949

Ficke, Ashley, Christopher Myrick, Lara Hansen ‘Potential impacts of global climate change of freshwater fisheries’ (2007) 17(4) *Reviews in Fish Biology and Fisheries* 581-613

Fisheries Research and Development Corporation (FRDC), 'Climate Change, Marine Biodiversity and the Fishing and Aquaculture Industries' (2010)

Follett, Grant, ‘Defining the Formless: Customary Law in the Pacific’ (2014) 39(2) *Alternative Law Journal,* 125-129

Food and Agriculture Organisation (2011) *Review of the state of world marine fishery resources FAO Fisheries and aquaculture technical paper 569.* Marine and Inland Fisheries

Service, Marine and Aquaculture Resources Use and Conservation Division, FAO Fisheries and Aquaculture Department. Rome

Forsyth, Miranda, 'A Typology of Relationships between State and Non-State Justice Systems,' (2007) 56 Journal of Legal Pluralism & Unofficial Law

Genner, Martin, David Sims, Alan Southward, Georgia Budd, Patricia Masterson, Matthew McHugh, Peter Rendle, Emily Southall, Victoria Wearmouth, Stephen Hawkins, 'Body-size dependent responses of marine fish assemblage to climate change and fishing over a century-long scale' (2010) 16 *Global Change Biology* 517-527

Gillet, Robert and Ian Cartwright 'The Future of Pacific Island Fisheries' (Secretariat of the Pacific Community Nouméa, New Caledonia, Pacific Island Forum Fisheries Agency, Honiara, Solomon Islands, 2010)

Gnanalingam, Gaya and Chris Hepburn, 'Flexibility in temporary fisheries closure legislation is required to maximize success' (2015) 61 *Marine Policy* 35-45

Guillotreau, Patrice, Liam Campling and Jan Robinson 'Vulnerability of small island fishery economies to climate and institutional changes' (2012) 4 *Current Opinion in Environmental Sustainability* 287-291

Heenan, Adel, Robert Pomeroy, Johann Bell, Philip L. Munday, William Cheung, Cheryl Logan, Russell Brainard, Affendi Yang Amri, Porfirio Aliño, Nygiel Armada, Laura David, Rebecca Rivera-Guieb, Stuart Green, Jamaluddin Jompa, Teresa Leonardo, Samuel Mamauag, Britt Parker, Janna Shackeroff, Zulfigar Yasin 'A climate-informed, ecosystem approach to fisheries management' (2015) 57 *Marine Policy* 182-192

Hickey, F. 'Traditional Marine Resource Management in Vanuatu: Worldviews in Transformation, Sacred and Profane' in Nigel Haggan, et al (eds.) Putting Fishers Knowledge to Work (2003)

Hickey, F. 'Additional Links and Support for Traditional Resource Management Approaches and Practices in the Constitution and Informal Legal Systems of Vanuatu' in Traditional Marine

Management Areas of the Pacific in the Context of National and International Law Policy (United Nations University, 2010)

Hoegh-Guldberg, Ove and John F. Bruno, 'The Impact of Climate Change on the Worlds Marine Ecosystems' (2010) 328(5985) *Science* 1523-1528

Hollis, D. and Rosen, T. United Nations Convention on the Law of the Sea (UNCLOS), 1982 http://www.eoearth.org/view/article/156775/

Hughes, Sara, Annie Yau, Lisa Max, Nada Petrovic, Frank Davenport, Michael Marshall, Timothy R. McClanahan, Edward H. Allison, Joshua E. Cinner, 'A framework to assess national level vulnerability from the perspective of food security: The case of coral reef fisheries' (2012) 23 *Environmental Science and Policy* 95-108

International Council on Human Rights Policy 'Research Project on Plural Legal Orders and Human Rights: An Approach Paper' (2008) 1-20

Johannes, Robert Earl, 'Government-supported, village-based management of marine resources in Vanuatu' (1998) 40(2) *Ocean and Coastal Management* 165-186

Keller, Brian D., Daniel F. Gleason, Elizabeth McLeod, Christa M. Woodley, Satie Airame´, Billy D. Causey, Alan M. Friedlander, Rikki Grober-Dunsmore, Johanna E. Johnson, Steven L. Miller, Robert S. Steneck, 'Climate Change, Coral Reef Ecosystems, and Management Options for Marine Protected Areas' (2009) 44 *Environmental Management* 1069-1088

Kent, H. 'The Historical Origins of the Three Mile Limit' (1954) 48(4) The American Journal of International Law 537

Kuruppu, Natasha, Reenate Willie, 'Barriers to reducing climate enhanced disaster risks in Least Developed Country-Small Islands through anticipatory adaptation' (2015) 7 *Weather and Climate Extremes* 72-83

Lam, Michelle, 'Consideration of customary marine tenure system in the establishment of marine protected areas in the South Pacific' (1998) 39(1) *Ocean and Coastal Management* 97-104

Léopold, Marc, Jennifer Beckensteiner, Jeremie Kaltavara, Jason Raubani, Sophie Caillon, 'Community-based management of near-shore fisheries in Vanuatu: What works?' (2013) 42 *Marine Policy* 167-176

Law Reform Commission of Western Australia, Aboriginal Customary Laws, Final Report (2006)

Lindstrom, Lamont, 'Chiefs in Vanuatu Today' in Geoffrey White and Lamont Lindstrom (eds.) Chiefs Today: Traditional Pacific Leadership and the Postcolonial State (1997)

Link, Jason S, Janet A Nye and Jonathan A Hare, 'Guidelines for Incorporating Fish Distribution Shifts into a Fisheries Management Context' (2011) 12 *Fish and Fisheries* 461-469

Martin, E. and Law, J. A Dictionary of Law (Oxford University Press, 6th ed, 2006)

McCarter, Joe, Michael Gavin 'In Situ Maintenance of Traditional Ecological Knowledge on Malekula Island, Vanuatu' (2014) 27 *Society and Natural Resources*, 1115-1129

McClanahan, Timothy R., Michael J. Marnane, Joshua E. Cinner, and William E. Kiene, 'A Comparison of Marine Protected Areas and Alternative Approaches to Coral-Reef Management' (2006) 16 *Current Biology* 1406-1413

McFarlane, Gordon, Jacquelynne King, Richard Beamish, 'Has there been recent changes in climate? Ask the Fish' (2000) 47 *Progress in Oceanography* 147-169, 149

Merino, Gorka, Manuel Barange, Julia L. Blanchard, James Harle, Robert Holmes, Icarus Allen, Edward H. Allison, Marie Caroline Badjeck, Nicholas K. Dulvy, Jason Holt, Simon Jennings, Christian Mullon, Lynda D. Rodwell, 'Can marine fisheries and aquaculture meet

fish demand from a growing human population in a changing climate?' (2012) 22 *Global Environmental Change* 795-806

Merry, Sally, 'Legal Pluralism' (1988) 22(5) *Law and Society Review,* 869-896

MRAG Asia Pacific 'Monitoring the Vulnerability and Adaptation of Pacific Coastal Fisheries to Climate Change.' Report Prepared for the Secretariat of the Pacific Community. Marine Resources Division (2010) Brisbane, Australia.

Murray, Cathryn, Selina Agbayani and Natalie Ban, 'Cumulative Effects of Planned Industrial Development and Climate Change on Ecosystems' (2015) 4 *Global Ecology and Conservation* 110-116

New Zealand Law Commission, 'Converging Currents: Custom and Human Rights in the Pacific' (2006)

Nurse, Leonard, Rodger McLean 'Small Islands' in *Climate Change 2014 Impacts, Adaptation and Vulnerability* (Working Group II Contribution to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change, Cambridge University Press, 2014)

Olsson, Per-Erik, Carl Folke and Firket Berkes, 'Adaptive Co-management for Building Resilience in Social–ecological Systems' (2004) 34 *Environmental Management* 75-90

Overland, James, Juergen Alheit, Andrew Bakun, James W. Hurrell, David L. Mackas, Arthur J. Miller, 'Climate controls on marine ecosystems and fish populations' (2010) 79 *Journal of Marine Systems* 305-315

Pachauri, Rajendra et al., 'Summary for Policymakers' in *Climate Change 2014 Synthesis Report* (Contribution of Working Groups I, II and III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change, Geneva, Switzerland) 13

Pearce, A. and Feng, M. 'Observations of Warming on the Western Australian Continental Shelf' (2007) 58 *Marine and Freshwater Research* 914-920

Pecl, Gretta, Tim M. Ward, Zoë A. Doubleday, Steven Clarke, Jemery Day, Cameron Dixon, Stewart Frusher, Philip Gibbs, Alistair J. Hobday, Neil Hutchinson, Sarah Jennings, Keith Jones, Xiaoxu Li & Daniel Spooner, Richard Stoklosa 'Rapid assessment of fisheries species sensitivity to climate change' (2014) 127 *Climate Change* 505-520, 514-515

Peel, Jacqueline, 'A paper umbrella which dissolves in the rain? The future for resolving fisheries disputes under UNCLOS in the aftermath of the Southern Bluefin tuna arbitration (United Nations Convention on Laws of the Sea)' (2001) 3(1) *Melbourne Journal of International Law* 53-78

Perry, Allison L., Paula J. Low, Jim R. Ellis, John D. Reynolds, 'Climate Change and Distribution Shifts in Marine Fishes' (2005) 308(5730) *Science* 1912-1915

Perry, R. Ian, Philippe Cury, Keith Brander, Simon Jennings, Christian Möllmann, Benjamin Planque, 'Sensitivity of Marine Systems to Climate and Fishing: Concepts, Issues and Management Responses' (2010) 79 *Journal of Marine Systems* 427-435, 427

Pierce, David, 'Future changes in biological activity in the North Pacific due to anthropogenic forcing of the physical environment' (2004) 62 *Climate Change* 389–418

Ryan Plummer, 'The Adaptive Co-Management Process: an Initial Synthesis of Representative Models and Influential Variables' (2009) 12:2 *Ecology and Society* 24.

Plummer, Ryan., and A. Hashimoto, 'Adaptive Comanagement and the Need for Situated Thinking in Collaborative Conservation' (2001) 16:4 *Human Dimensions of Wildlife* 222-235.

Pörtner Hans et al., 'Ocean Systems' in *Climate Change 2014: Impacts, Adaptation, and Vulnerability. Part A: Global and Sectoral Aspects* Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change, Cambridge University Press, (2014) 436-437

Remoundou, Kyriaki, Pedro Diaz-Simal, Phoebe Koundouri, Bénédicte Rulleau, 'Valuing climate change mitigation: A choice experiment on a coastal and marine ecosystem' (2015) 11 *Ecosystem Services* 87-94

Rhein Monika et al. 'Observations: ocean'. Climate Change 2013: The Physical Science Basis ed T F Stocker, D Qin, G-K Plattner, M Tignor, S K Allen, J Boschung, A Nauels, Y Xia, V Bex and P M Midgley Cambridge: Cambridge University Press(2013) Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change *257-258, 295*

Rouyer, Tristan Geir Ottersen, Joël M. Durant, Manuel Hidalgo, Dag Ø. Hjermann, Jonas Persson, Leif Chr. Stige, Nils Chr. Stenseth, 'Shifting dynamic forces in fish stock fluctuations triggered by age truncation?' (2011) 17(10) *Global Change Biology* 3046-3057

Salinger, Jim and Alistair Hobday, 'Safeguarding the future of oceanic fisheries under climate change depends on timely preparation' (2013) 119 *Climatic Change* 3-8

Salinger, M. J., J. D. Bell, K. Evans, A. J. Hobday, V. Allain, K. Brander, P. Dexter, D. E. Harrison, A. B. Hollowed, B. Lee, R. Stefanski 'Climate and oceanic fisheries: recent observations and projections and future needs' (2013) 119 *Climatic Change* 213-221

Saunier, R. and Meganck, R. Dictionary and Introduction to Global Environmental Governance (Earthscan, 2009)

Sharma, Sapna, M. Jake Vander Zanden, John J. Magnuson, John Lyons, 'Comparing Climate Change and Species Invasions as Drivers of Coldwater Fish Population Extirpations' (2011) 6(8) *PLoS ONE* 1-8

Sherman, Kenneth, 'Toward Ecosystem-based Management (EBM) of the World's Large Marine Ecosystems During Climate Change' (2014) 11 *Environmental Development* 43-66

Techera, Erika, 'Customary law and Community-Based Fisheries Management Across the South Pacific Region' (2010) 2 *Journal of the Australasian Teachers Association* 279-292

Techera, Erika, ‘Legal Pluralism, Indigenous People and Small Island Developing States: Achieving Good Environmental Governance in the South Pacific’ (2010) 42(61) *Journal of Legal Pluralism and Unofficial Law* 171-204

Techera, Erika. Marine Environmental Governance: From International Law to Local Practice (Routledge 2012) 164

Techera, Erika, ‘Enhancing legal frameworks for biodiversity conservation in the Pacific’ (2015) *Pacific Conservation Biology* CSIRO, 1-10

Teck, Sarah, Benjamin S. Halpern , Carrie V. Kappel, Fiorenza Micheli, Kimberly A. Selkoe, Caitlin M. Crain, Rebecca Martone, Christine Shearer, Joe Arvai, Baruch Fischhoff, Grant Murray, Rabin Neslo and Roger Cooke, ‘Using Expert Judgment to Estimate Marine Ecosystem Vulnerability in the California Current’ (2010) 20(5) *Ecological Applications* 1402-1416

Urban, Mark, Robert Holt, Sarah Gilman and Joshua Tewksbury ‘Heating up relations between cold fish: competition modifies responses to climate change’ (2011) 80(3) *The Journal of Animal Ecology* 505-507

Vierros, Marjo, *Traditional Marine Management Areas of the Pacific in the Context of National and International Law and Policy* (United Nations University – Institute of Advanced Studies Traditional Knowledge Initiative, 2010) 8

Walther, Gian-Reto, Eric Post, Peter Convey, Annette Menzel, Camille Parmesan, Trevor J. C. Beebee, Jean-Marc Fromentin, Ove Hoegh-Guldberg and Franz Bairlein, ‘Ecological responses to recent climate change’ (2002) 416 *Nature* 389-395

Weeks, Rebecca and Stacy D Jupiter, ‘Adaptive Comanagement of a Marine Protected Area Network in Fiji’ (2014) 27:6 Conservation Biology, 1234.

Weisbrot, David, ‘Custom, Pluralism, and Realism in Vanuatu: Legal Development and the Role of Customary Law’ (1989) 13(1) *Pacific Studies* 65-97

Welch, Megan J., Sue-Ann Watson, Justin Q. Welsh, Mark I. McCormick & Philip L. Munday, 'Effects of elevated CO2 on fish behaviour undiminished by transgenerational acclimation.' (2014) 4 *Nature Climate Change* 1086-1089

Wong, Poh Poh, I.J. Losada, J.-P. Gattuso, J. Hinkel, A. Khattabi, K.L. McInnes, Y. Saito, and A. Sallenger: Coastal systems and low-lying areas. In: Climate Change 2014: Impacts, Adaptation, and Vulnerability. Part A: Global and Sectoral Aspects. Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change [Field, C.B., V.R. Barros, D.J. Dokken, K.J. Mach, M.D. Mastrandrea, T.E. Bilir, M. Chatterjee, K.L. Ebi, Y.O. Estrada, R.C. Genova, B. Girma, E.S. Kissel, A.N. Levy, S. MacCracken, P.R. Mastrandrea, and L.L. White (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, (2014) 361-409

Zorn, J. 'Custom then and now: the changing Melanesian family' in Anita Jowitt and Tess Newton Cain (eds), Passage of Change: Law Society and Governance in the Pacific (2003)

Case List

Southern Bluefin Tuna (Australia and New Zealand v. Japan), 4 August 2002, 39 ILM 1359 (2000)(ITLOS)

The MOX Plant Case (Ireland v. United Kingdom) (Interim Measures), Order of 3 December 2001, 41 ILM 405 (2002) (ITLOS)

People of Rull ex rel Ruepong v MV Kyowa Violet, 14 FSM Intrm. 403 (Yap. 2006) (21 September 2006)

Ulelio v Nelulu Land Group, PNGLR (26 March 1998)

Legislation

Constitution (Amendment) Act 1997 (Fiji)

Constitution of the Federated States of Micronesia 1975

Constitution of the Independent State of Samoa 1960 (Samoa)

Constitution of the Republic of Palau 1979

Constitution of the Republic of Vanuatu 1990 (Vanuatu)
Custom and Adopted Laws Act 1971 (Nauru)
Criminal Law (Compensation) Act 1991(PNG)
Environmental Management and Conservation Act 2002 (Vanuatu)
Fisheries Act 2005 (Vanuatu)
Indigenous and Tribal Populations Convention (ILO Convention No. 107)
Indigenous and Tribal Peoples Convention (ILO Convention No. 169)
Land Acquisition Act [Cap. 215] (Vanuatu)
Laws of Tuvalu Act 2008 [Cap 1.06] (Tuvalu)
National Council of Chiefs (Organisation) Act (Cap 183).
Nauru Fisheries and Marine Resources Authority Act 1997 (Nauru)

Treaties

Convention on Biological Diversity (Rio de Janeiro) 5 June 1992 (entered into force 29 December 1993) 31 ILM 822 (1992)

United Nations Convention on the Law of the Sea, opened for signature 10 December 1982, 1833 UNTS 3 (entered into force 16 November 1994)

Convention on the Conservation of Antarctic Marine Living Resources (Canberra) 20 May 1980, (entered into force 7 April 1982), 19 ILM 841 (1980)

International Labor Organization, *Indigenous and Tribal Peoples Convention*, C169 7 June 1989, (entered into force 5 September 1991) 1650 UNTS 383 (1989)

Protocol on the Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from Their Utilization to the Convention on Biological Diversity (Nagoya) 29 October 2010 (entered into force 12 October 2014)

United Nations Convention on the Law of The Sea (Montego Bay) 10 December 1982 (entered into force 16 November 1994) 21 ILM 1261 (1982)

United Nations Declaration on the Rights of Indigenous Peoples, GA Res 61/295, UN GAOR, 61st sess, 107th plen mtg, Supp No 49, UN Doc A/RES/61/295 (13 September 2007).